Claims

1. Electrode having

- a two-dimensionally shaped, electrically conductive current collector (1), which contains perforations (5),

- a first electrode layer (15), which is arranged on a main surface of the current collector and in its perforations, so as to be form-fitting with and firmly bonded to the current collector,

- an electrically conductive, corrosion-resistant intermediate layer (10), which is form-fittingly arranged between the current collector and the electrode layer, wherein the intermediate layer comprises materials that are selected from:

- precious metals, graphitic carbon, metal nitrides and metal carbides.

2. Electrode according to the preceding claim,

- wherein a second electrode layer is arranged on the other main surface of the current collector.

3. Electrode according to the preceding claim,

- wherein the first and second electrode layer are made of the same material.

4. Electrode according to one of the preceding claims,

- wherein the intermediate layer is continuously arranged on the current collector.

5. Electrode according to one of the preceding claims,

- wherein the current collector comprises an elongated aluminum foil provided with perforations.

6. Electrode according to one of Claims 1 to 4,

- wherein the current collector comprises a net of metal wires.

7. Electrode according to one of Claims 1 to 4,

- wherein the current collector comprises an etched foam metal.

8. Electrode according to one of the preceding claims,

- wherein the first and/or second electrode layer comprises conductive polymers.

9. Electrode according to one of Claims 1 to 7,

- having a first and/or second electrode layer, which comprises activated carbon.

10. Electrode according to one of Claims 1 to 7,

- wherein the first and/or second electrode layer comprises metal oxides.

11. Method for the production of an electrode, comprising the process steps:

A) a two-dimensionally shaped current collector (1), which contains perforations (5), is produced,

B1) an electrically conductive, corrosion-resistant intermediate layer (10), which comprises materials that are selected from among:

- precious metals, graphitic carbon, metal nitrides and metal carbides, is then produced on the current collector,

B) after which an electrode layer (15) is produced on at least one main surface of the current collector, over the intermediate layer, in such a way that it is form-fittingly and firmly bonded to the current collector.

12. Method according to the preceding claim,

- wherein, in process step B), the electrode layer is produced on both main surfaces of the current collector.

13. Method according to one of Claims 11 or 12,

- wherein, in process step A), the current collector is produced by punching perforations in a metal foil and stretch-forming this foil.

14. Method according to the preceding claim,

- wherein an aluminum foil is used as the metal foil,

- wherein, in process step A1), surface layers of the foil are removed prior to process steps B1) and/or B) to improve the conductivity of the foil.

15. Method according to one of Claims 11 or 12,

- wherein, in process step A), the current collector is produced by weaving metal wires into a metal net.

16. Method according to one of Claims 11 to 15,

- wherein, in process step B1), the electrically conductive intermediate layer, in the form of a metal layer, is produced by means of a galvanic process or by means of a CVD or PVD process.

17. Method according to one of Claims 11 to 15,

- wherein, in process step B1), a carbon layer, as an electrically conductive intermediate layer, is produced by means of dip coating of the current collector (1) in a carbon bath.

18. Method according to one of Claims 11 to 17,

- wherein, in process step B), the electrode layer is produced by blade coating of a liquid or viscous phase, which contains the electrode material (25).

19. Method according to one of Claims 11 to 17,

- wherein, in process step B), the liquid or viscous phase, which contains the electrode material (25), is first applied to a carrier foil (30) and dried,

- wherein, subsequently, the electrode material (25) is transferred from the carrier foil (30) to the current collector (1), so that the electrode layer is formed over the intermediate layer.

20. Method according to the preceding claim,

- wherein the electrode material is mixed with a binder and applied to the carrier foil,

- wherein the electrode material is transferred from the carrier foil to the current collector by melting the binder.

21. Method according to one of Claims 11 to 20,

- wherein activated carbon, metal oxides or conductive polymers are used as electrode material.

22. Electrochemical double-layer capacitor,

- having electrodes according to one of Claims 1 to 7 or 9, which comprise activated carbon and/or graphitic carbon,

- wherein a porous separator is arranged between the electrodes,

- wherein the electrodes and the separator are impregnated with an electrolyte.

23. Hybrid capacitor,

- having a first and a second electrode according to one of Claims 1 to 10, wherein the first electrode comprises active carbon and/or graphitic carbon and the second electrode comprises electrically conductive polymers and/or metal oxides,

- wherein a porous separator is arranged between the first and second electrode,

- wherein the electrodes and the separator are impregnated with an electrolyte.

24. Pseudo-capacitor,

- having a first and a second electrode according to one of Claims 1 to 10, wherein both electrodes comprise either metal oxides or conductive polymers,

- wherein a porous separator is arranged between the first and second electrode,

- wherein the electrodes and the separator are impregnated with an electrolyte.